

★

15" x 15" photoplotter

1 mil resolution (i.e. 15k²)

48 intensity levels

\$50k.

Top speed 4" sec
(expos.)

all points
in a row)

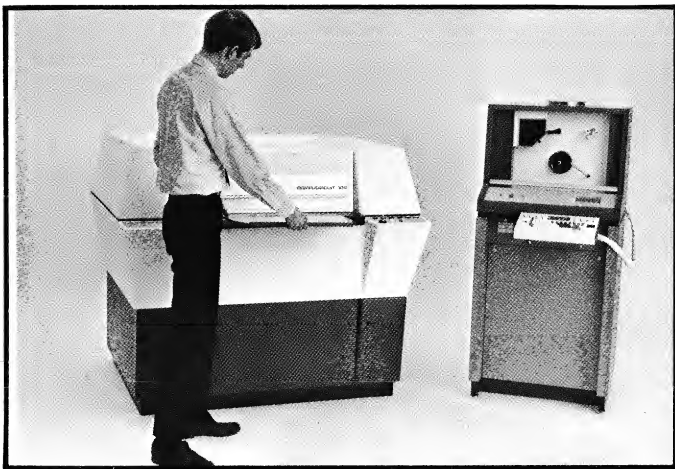
Takes time
to change
grey levels

— worst
case 2" sec

(changing
it each pt;
dedicated
mini-controller.)



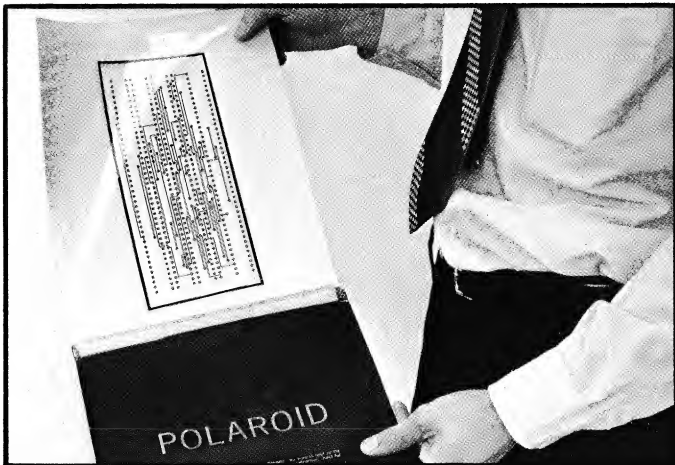
1. He held the light-tight gate open as he slid the film cassette into the Compucircuit 100. He used to have to do all this in a darkroom. But that seemed like a long time ago: the dark ages. And that old photoplotter seemed like something right out of the Stone Age.



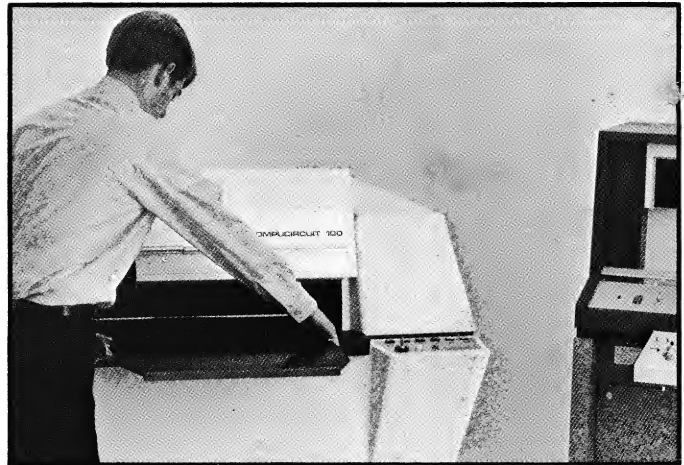
2. Now he removed the slide. He hurried a bit. This was a prototype job, and he knew the design men wanted to go over this artwork master that night.



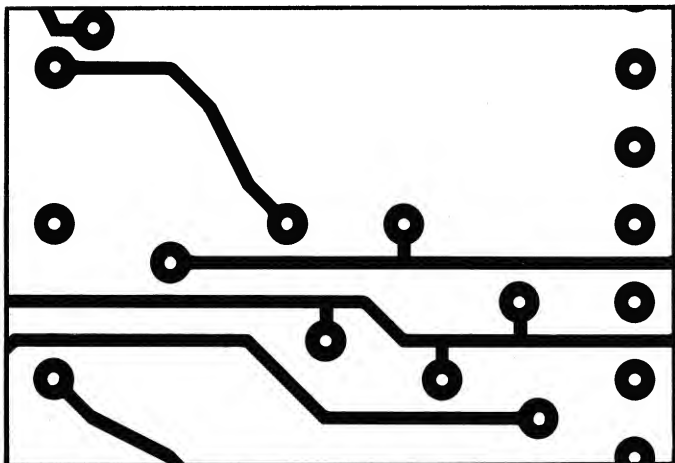
3. He flicked the mode switch to Off-line Mag Tape, and turned to the tape transport. Now he threaded the mag tape system. He was ready to try out the ideas he'd been working on.



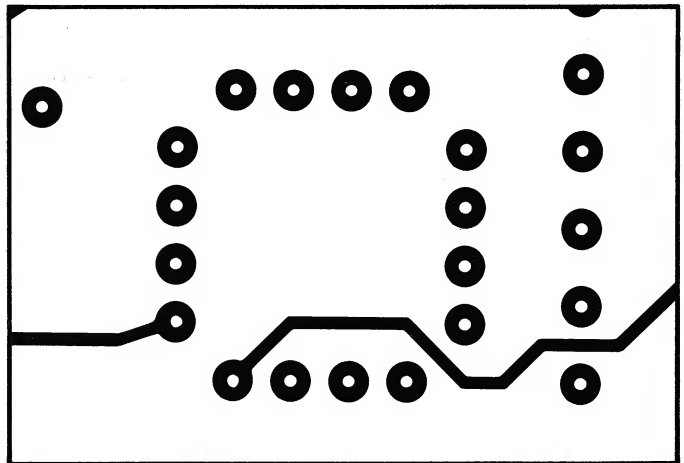
6. They didn't really think he'd make it. But here he was; taking his time and running a test. And he inspected the Polaroid Land Film he'd used as a quick check for his ideas on the plot. Beautiful.



7. Again he loaded the film cassette. This time with high-contrast Ortho 3 film for final artwork. He pressed the start button. But this time there was no mystery. He knew it would work, he'd just seen it. But there was a little thrill. Tonight he'd hand them the finished artwork. With the old photoplotter it would have taken all day. That's what the prototype people remembered.

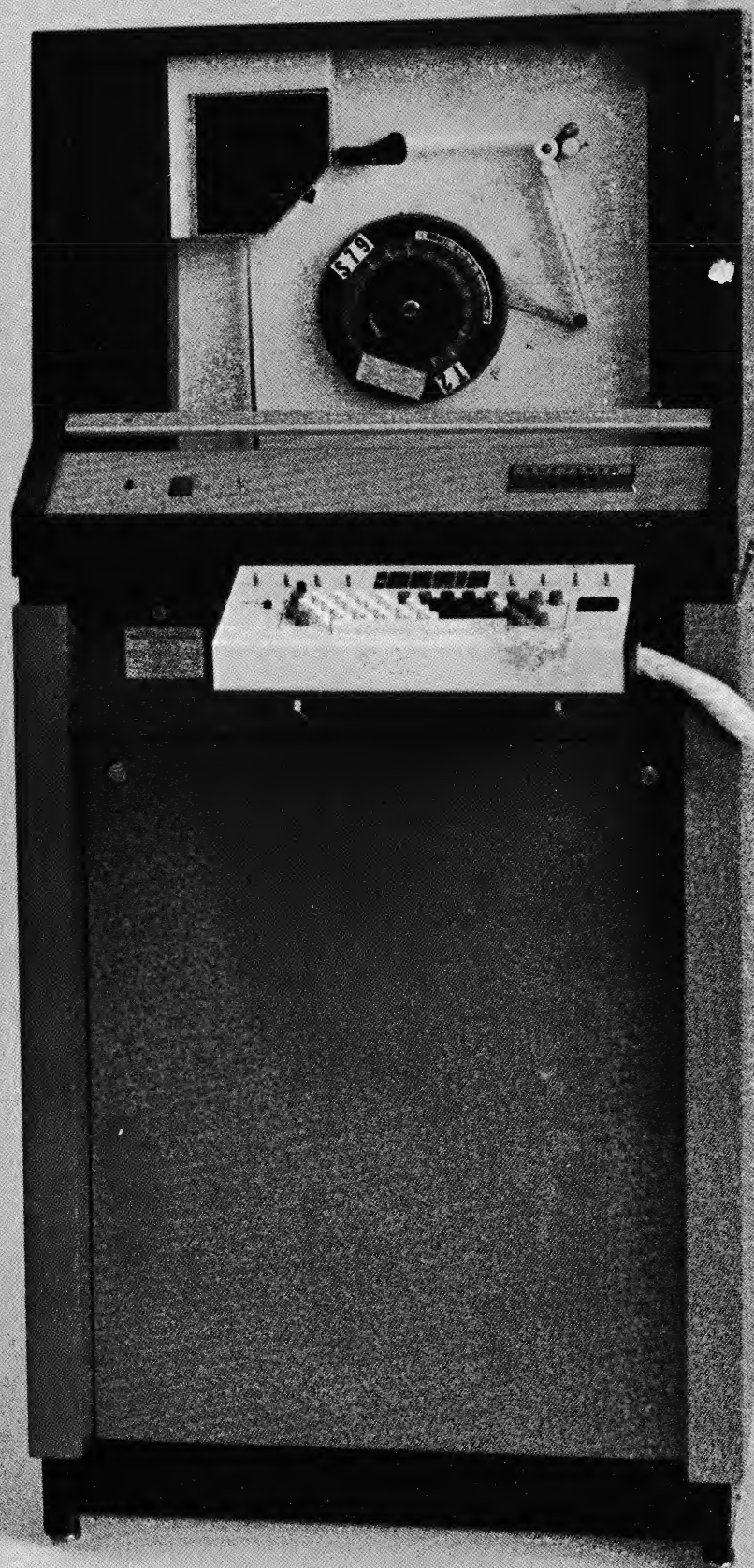


10. He noted there was no overshoot on the T's and corners. This was really a clean machine! And there was no blooming at the corners. Maybe that was because of the automatic exposure control. But who cares why?



11. He could see the pads were placed accurately. Within 0.0005".





COMPUCIRCUIT™ 100

The preceding drama was brought to you by Computervision. And now a word from our sponsor: Compucircuit 100.

This machine is a highly accurate, high speed photoplotting system with auxiliary pen plotting capability.

The idea behind it is not too unusual. It's a machine for the generation of economic artwork masters for printed circuits and integrated circuits.

What's unusual is the way it does this job. What's unusual is the way it accomplishes throughput. The way that time and money are saved from the beginning to the completion of a job.

But that's not all that's unusual. Read on.

No darkroom.

The Compucircuit 100 is a free-standing, light-tight machine. It's cassette fed with either film or a glass plate. So it doesn't need a darkroom. It doesn't need darkness at all for operation or loading.

The machine is kept at positive pressure to keep dust out. And it has a special port for entry of preconditioned air. In other words, you only have to air-condition the machine, not the whole room.

Optional on-site processor.

The whole photoplotting operation can be darkroom-free with our fully automatic processor.

The processor is loaded with the same cassette that you loaded into the plotter. Developed artwork is ready for visual inspection in two minutes.

And the processor provides a mechanism for reloading the cassette with another sheet of film. No external plumbing, no darkroom, again. It can easily be used in an engineering office environment.

Shutterless, which means faster.

The fact that the Compucircuit 100 is shutterless makes it many times as fast (by eliminating the long open-close mechanical shutter time).

An average plot on the Compucircuit takes about 25 minutes. On another machine, it takes 60 minutes. That's what we mean by throughput. And throughput is the name of the game.

It has a selection of 96 photoplotting apertures, including 32 plotting symbols which can be used as flashed pads and for line drawing, and 64 alphanumeric characters and symbols. And indexing is fast, 300 milliseconds maximum.

Accurate: the plot doesn't thicken.

Compucircuit 100 is specially designed so that the light source automatically provides both endpoint intensification and exposure control to prevent line blooming. The photo head floats at a constant distance from the emulsion, insuring proper focus without contacting the film or glass plate surface. An air jet zaps dust from the immediate plotting area, reducing pinholing.

An option for nit-pickers.

A special high-accuracy option can be provided which allows a maximum positioning error of only 0.0005".

And another.

We also offer a means of indexing the translation table to within one step of the hardware-defined origin of the system.

Coupling this option with accurately located tooling pins and prepunched film, provides a means of achieving a layer-to-layer registration to within $\pm 0.001"$. We even add hardware mirroring capability for the guy who made a mistake.

Optional custom aperture discs.

Any special characters or symbols can be placed on the aperture disc. It's up to you.

And changing discs takes only about five minutes.

Our interchangeable aperture discs allow up to 8 apertures out of 32 to be manually replaced for custom work.

The plot.

The standard plotting area is 15" x 15". It has a maximum positioning error of 0.001" over the total travel area.

The optional big plot.

This one is 15" x 20" and still maintains the 0.001" error over the travel area.

The software.

Our machine's Command Language allows the highest possible degree of program efficiency and ease of operation.

The basic software consists of Fortran-callable subroutines:

Line Vector Moves, with X and Y components of up to 20", and both incremental and absolute addressing.

Functional Callout of Annotation Characters, rather than callout by a predefined address.

Mirror Imaging of the photoplot.

Independent Definition of both the variable grid size, and the magnification of the photoplot.

Automatic Overtravel Recognition through a position count for any command which moves the plotter outside the defined film boundaries.

Circular Interpolation.

Software exposure control.

The basic software Command Language allows two separate modes of exposure, each independently callable under program control.

One is line plotting. It's automatically entered on linear vector command. It controls the exposure for the best results in a wide range of line weights.

The other is single aperture flashing. This mode allows the light source to be pulsed-on for a given length of time, to properly expose any of the 96 apertures on a fixed coordinate of the table. It also allows end-of-line intensification to achieve uniform film density.

Our Polaroid Land Film option: The 15-second excitement.

Now we offer a proprietary attachment allowing the use of Polaroid Land Film. So you can make quick plots five times faster than the final plots. It's ideal for test plots, previewing and checking before the final.

You can interface with an IBM 1130 and other popular computers.

Or at least your Compucircuit can.

Using the standard small drum plotter interface that is available from IBM, this option permits the Compucircuit to be plug-compatible with the IBM 1130.

Included are hardware controller for linear interpolation, aperture selection, and automatic acceleration and deceleration.

Compatible with another miracle.

We also make INTERACTgraphic 1, an interactive computer-graphics system which increases the throughput of your PC or your LSI designs. And both machines have been designed with a common controller and phone line interface. Either the operator at the keyboard or the program can control the selection of which device the plot will be made on.

The operator can also select a mode by which the plot is produced on both the Compucircuit (at 1x) and the INTERACTgraphic (at 2x).

The Compucircuit Zoom Optical Head.

We have a version of the Compucircuit 100 for use in IC design. This is it.

It contains a photohead which incorporates 24 fixed apertures and 8 operation-changeable apertures. There is an optical zoom system which lets you select the aperture necessary for the generation of 100x integrated circuit photomasks.

Both the aperture location and the optical gain setting (zoom) are program controlled, permitting the Compucircuit zoom to photoplot any aperture including squares and rectangles from 0.002" to 0.300" in increments of 0.0001".

The maximum selection time of any aperture is 300 milliseconds. And the program callable exposure control provides the optimum exposure at each aperture setting.

Go ahead, buy it. It's cheap.

Your last photoplotted artwork probably cost you \$75 to \$150 per hour. We figure that's too much.

Leasing a Compucircuit 100, you can photoplot the identical artwork in your own facility for \$8 per hour.

Go ahead, break it.

Another advantage of the Compucircuit 100 is the easy main-

tenance. The idea is to allow change of parts without eating up valuable time.

With our machine you can change heads in 20 minutes; aperture disc in 3 minutes; electronics in 20 minutes; pre-aligned and mounted lamps in 3 minutes; and the whole table in 2 hours.

Easy.

Compucircuit 100 Magnetic Tape System.

This system provides photoplotting capability from previously prepared tapes (off-line) or, with the optional interface, from a remote data source at 1200 baud. (burst mode)

The Computervision fully buffered IBM-compatible magnetic tape unit provides a magnetic tape system with both read and write capability. Error checking is provided by means of horizontal and vertical parity in addition to the IBM structured CRC block check.

The system also contains an automatic tape error recovery procedure in which a second pass is attempted at reading a block of information in which an error has been detected. If the second pass also fails, the error stop indicator on the plotter control panel is lighted, and the plot is halted.

The Compucircuit tape system permits off-line editing of the magnetic tape at either the block or word level through direct keyboard entry. It is available in 7 or 9 track versions.

SPECIFICATIONS

ACCURACY

Absolute accuracy*: .001"

Absolute Accuracy – Special Option*: .0005"

Absolute Aperture Accuracy*: .0005"

Focus Accuracy: .00025"

Repeatability: (Table), .0005" (Aperture) .0001"

Resolution (Step Size): .0005"

FORMAT

Number of Apertures: 96

Minimum Line Width: .005"

Maximum Line Weight: .150"

Maximum Line Weight – Special Option: .300"

Line Tolerance: .0003"

Usable Film Area: 15" x 15"

Usable Film Area – Special Option: 15" x 20"

Film Size: Any film or glass plate up to 16" x 20"

Aperture Size Range: .005" - .150"

Aperture Size Range – Special Option: .002" - .300"

Pad Flash Time: 15 Milliseconds.

SPEED

Maximum Aperture Selection Time: 300 milliseconds

Maximum Plotting Speed: 100"/min.

Maximum Slewing Speed: 210"/min.

Quick Plot: 5 times faster than finished plot.

OPERATIONAL FEATURES

Linear and Circular Interpolation

Exposure Control

Acceleration and Deceleration Control

Daylight Operation and Loading

Pen Plotting Capability

PHYSICAL

Dimensions:

Depth: 48.5" (34.5" with cover removed)

Width: 56.5"

Height: 46

Weight: 1800 lbs.

Power Requirements: 115V \pm 10%, 60 Hz, 25 amps

MAGNETIC TAPE

Modes of Operation: Read, write, keyboard entry (keyboard provided)

Format: IBM Compatible, 9-track, 800 bpi; 7-track, 200 bpi.

Record Length: 100 words, longitudinal parity, and CRC check.

Tape Reel Size: 8½"

Dimensions:

Depth: 29"

Width: 26"

Height: 55"

Weight: 200 lbs.

Power Requirements: 115V \pm 10%, 60 Hz, 3 amps

OPTIONS

REMOTE COUPLER

Transmission Rate: 1200 baud, half-duplex

Data-Set: Bell System 202c or equivalent

Coding: ASCII

Error Checking: Word and multiple transmission

Polaroid Land Film Cassette and Processor

On-Site Processor

IBM 1130 Interface

Accurate Origin

Custom Aperture Discs

0.0005" Accuracy

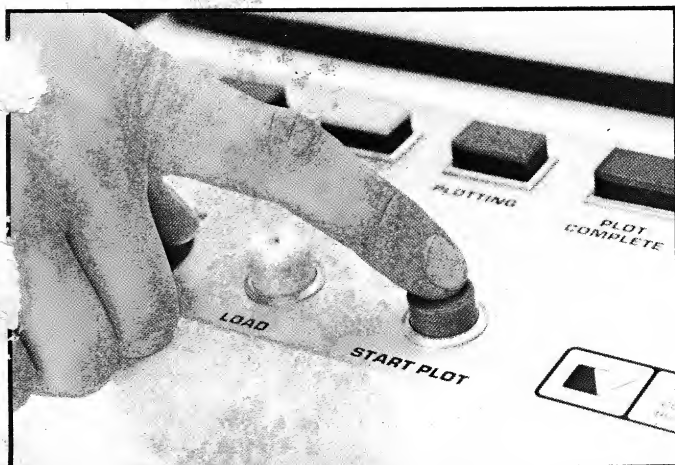
Extended Plotting Area

Interface for operation with INTERACTgraphic 1

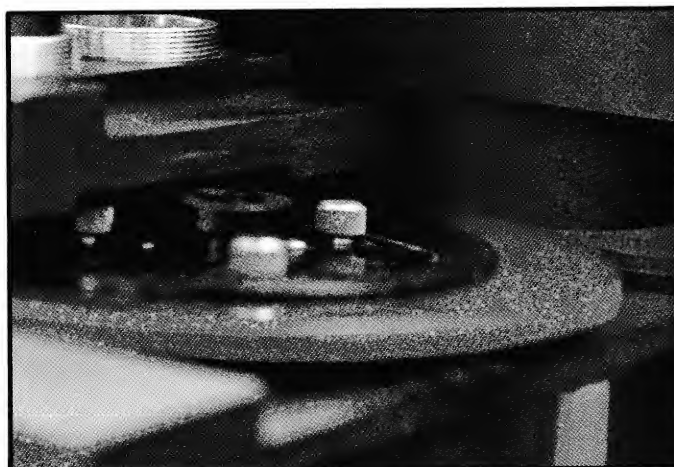
Compucircuit 100/IC zoom optical head (for IC artwork)

Interchangeable Aperture Disc

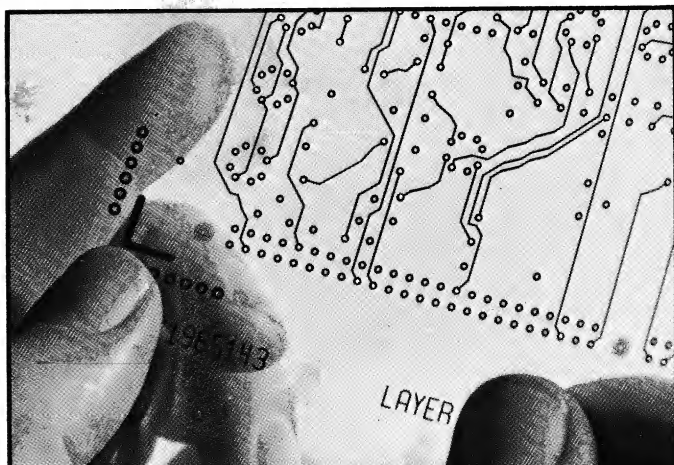
* Per axis, 1 standard deviation.



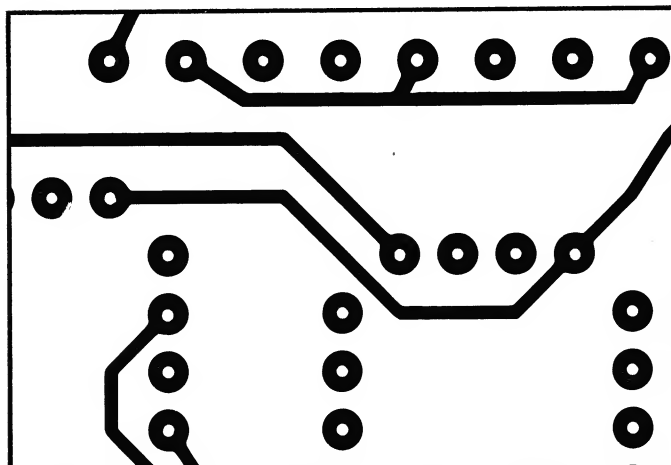
4. The light intensity control was set for the right ASA film rating. The mode was set. That was it: He pushed the button. And those guys in the prototype lab were worried about getting the finished artwork masters on time.



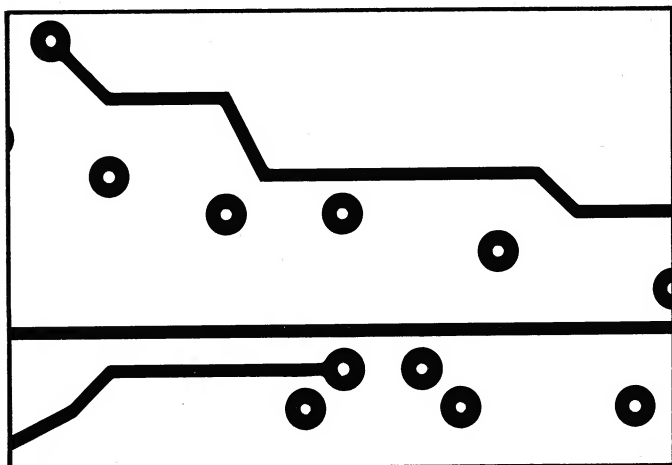
5. Inside the Compucircuit 100, the aperture disc rotated, the light flashed, the film table moved, the light flashed, the aperture disc moved to another symbol, the light flashed, the film table moved . . . spots adding up to lines, letters adding up to words, hundreds of fraction-of-a-second photo operations adding up to a finished plot.



8. As he checked the plot for overall quality he thought about a thing called throughput. There it was in twelve minutes. It used to take 35. The difference is probably the absence of the slow mechanical shutters. Without them, the Compucircuit 100 is about three times faster than any other photoplotter.



9. All he could think of was the old photoplotter. The lines it turned out looked like wet noodles next to these. All the 10 mil lines were of constant thickness. That meant a lot to guys dealing in precision.



12. That old machine really didn't do him justice. After all, a guy thinks in all directions. Without the Compucircuit's Linear Interpolation, he couldn't plot in all directions. Now all he had to do was leave it for the creative boys to look over.

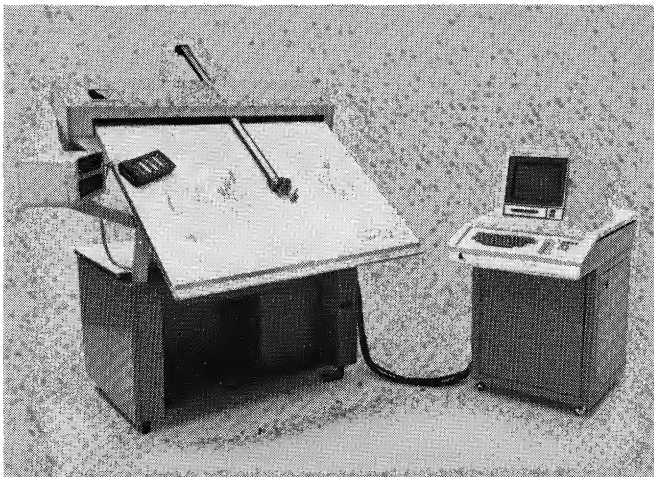


13. He could go home now. The last thing he did was the thing he used to do first. He turned off the lights.



**COMPUTERVISION CORPORATION
NORTHWEST INDUSTRIAL PARK
SOUTH AVE., BURLINGTON, MA 01803, (617) 272-7240**

Our new machine is sort of a combination Leonardo da Vinci and Ebenezer Scrooge.



Our inspirations may seem like strange bed-fellows. But the product makes a lot of sense.

The idea is an interactive computer-graphic system with Leonardo's genius and Ebenezer's stinginess.

We invented the machine because we knew the main problems of product development. What was needed was a machine that could make your engineers more productive, and still save money.

So that's what it is: INTERACTgraphic 1, \$1200 a month.

Our machine does amazing things. It digitizes, displays and plots on a fourfoot interactive surface.

And it saves money a very simple way. It allows you to reduce the number of people and hardware peripherals on your project.

Cost/effective computergraphics, we call it: INTERACTgraphic 1.

You can see our machine in action in one of the places we've already delivered it. You can see it cutting costs in custom LSI design, IC mask layout and printed circuit production as well as architectural and civil engineering design.

You can see our new machine at Booth 4932 Nepcon east, or if you can't wait: call or write Computervision Corporation, Northwest Industrial Park, South Avenue, Burlington, MA 01803, (617) 272-7240.

Computervision Corporation

Look. If you've got the computer, we've got the vision.